and salts thereof, where:

n is an integer ranging from 2 to about 2,000;

m is either 0 or 1, provided that m is 1 at least once in the compound and m is zero at least once in the compound when Z is an amino acid and when m=0 for R at a terminus, the terminus of the polyamino acid is an NH_2 or a carboxyl group;

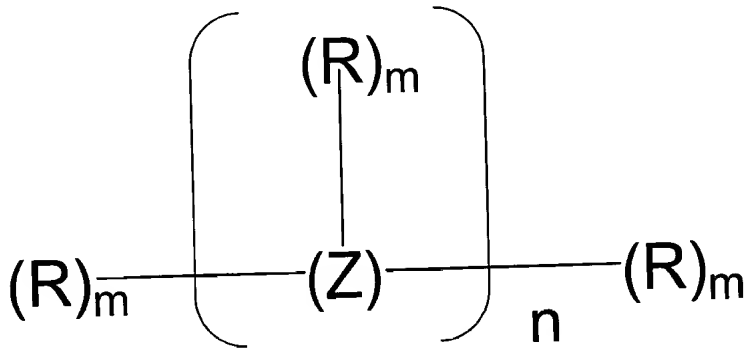
R is R_A or R_B, where R_A is C_{1-23} alkyl or alkenyl and R_B is a steroid selected from the group consisting of stigmasterol, ergosterol and cholic acid; and

Z is a basic amino acid wherein Z groups are linked by peptide bonds.

106. A compound according to claim 105 where Z is selected from the group of amino acids consisting of ornithine, lysine, arginine and histidine

107. A compound according to claim 105 where Z is L-ornithine.

108. A polysaccharide with the structure:



and salts thereof where:

n is an integer ranging from 2 to about 2,000;

m is either 0 or 1;

R is R_A or R_B, where R_A is an alkyl or alkenyl group having 12 to 22 carbon atoms and R_B is a steroid selected from the group consisting of stigmasterol, ergosterol and cholic acid; and

Z is a monosaccharide having from 3 to 7 carbon atoms wherein Z groups are linked by glycosidic bonds when m=0 for R at a terminus, the terminus of the polysaccharide dependent upon Z is H or OH.

109. A compound according to claim 108 where said sugar comprises a cationic substituent.

110. A compound according to claim 109 where said cationic substituent is a tertiary amine.

111. A compound according to claim 109 where said caionic substituent is diethylaminoethyl.

112. A compound according to claim 109 where said sugar is glucose and siad cationic subsitutent is diethylamioethyl.

113. A composition for transfecting a cell with a nucleic acid which comprises a nucleic acid and one or more compounds according to claim 105.

114. A lipid aggregate which comprises one or more compounds of claim 105.

115. A method for transfecting a cell comprising the step of contacting the cell with a lipid aggregate comprising a nucleic acid and one or more compounds according to claim 105.

116 Acomposition for transfecting a cell with a nucleic acid which comprises a compound of claim 105 capable of complexing said nucleic acid to be transfected into said cell, and a transfection-enhancing agent selected from the group consisting of an enveloped virus, a membrane virus, a viral component, and a non-viral fusagenic compound.

117. A composition according to claim 116 wherein said transfection-enhancing agent is an enveloped virus, and wherein said enveloped virus is an alphavirus.

118. A composition according to claim 117 wherein said alphavirus is Semliki Forest virus.

119. A composition according to claim 116 wherein said transfection-enhancing agent is a viral component and wherein said viral component is selected from the group consisting of viral proteins, envelope fusion peptides, viral spike glycoproteins, viral peptides of viral spike glycoproteins, and viral envelope fragments containing embedded viral protein.

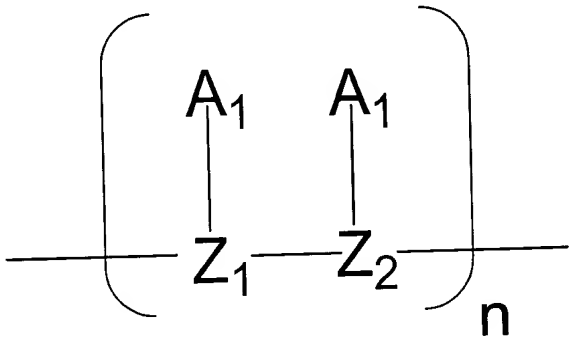
120. A composition according to claim 116 wherein said transfection-enhancing agent is a non-viral fusagenic peptide.

121. A method for transfecting a cell comprising the steps of contacting the cell with a transfecting composition of claim 116.

122. A transfection kit which comprises one or more compounds of claim 105.

123. The transfection kit of claim 122 further comprising a viral agent, a component of an enveloped virus, or a non-viral fusagenic peptide.

124. A lipophilic polyamino acid of the formula:



and salts thereof,

where:

Z_1 and Z_2, independently of one another, are both amino acids selected from the group consisting of ornithine, lysine, arginine and histidine;

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n is an integer ranging from 1 to about 2,000;

A_1 and A_2, independently of one another, are selected from the group consisting of the groups X_1 - X_4 as follows:

X_1 is a straight-chain alkyl, alkenyl, or alkynyl group having from 2 to about 22 carbon atoms wherein one or more non-neighboring $-CH_2-$ groups can be replaced with an O or S atom;

X_2 is a branched alkyl, alkenyl, or alkynyl group having from 2 to about 22 carbon atoms wherein one or more non-neighboring $-CH_2-$ groups can be replaced with an O or S atom;

X_3 is a straight-chain or branched alkyl group substituted with one or two OH, SH, NH_2 or amine groups within about 3 carbon atoms of the bond between X_3 and Z;

X_4 is a substituted straight-chain or branched alkyl, alkenyl or alkynyl group having from 2 to about 22 carbon atoms wherein the substituent is an aromatic, alicyclic, heterocyclic or polycyclic ring and wherein one or more of the non-neighboring $-CH_2-$ groups of said alkyl, alkenyl or alkynyl group can be substituted with an O or S atom; and

the terminii of the polyamino acid are an NH_2 and a OH.

125. The lipophilic polyamino acid of claim 124 wherein n is between 10 and 50.

126. The lipophilic polyamino acid of claim 124 wherein Z_1 and Z_2 are lysines.

127. The lipophilic polyamino acid of claim 124 wherein Z_1 and Z_2 are arginines.

128. The lipophilic polyamino acid of claim 124 wherein A_1 and A_2, independently of one another, are a straight-chain or branched alkyl, alkenyl, or alkynyl group having from 2 to about 22 carbon atoms wherein one or more non-neighboring $-CH_2-$ groups can be replaced with an O or S atom.

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129. The lipophilic polyamino acid of claim 128 wherein alkyl, alkenyl, or alkynyl groups have from about 12 to about 22 carbon atoms.

130. The lipophilic polyamino acid of claim 124 wherein the A_1 and A_2 groups are alkyl groups having from about 12 to about 22 carbon atoms.

131. The lipophilic polyamino acid of claim 124 wherein A_1 and A_2, independently of one another, are straight-chain or branched alkyl groups substituted with one or two OH, SH, NH_2, or amine groups within about 3 carbon atoms of the bond between X_3 and Z.

132. The lipophilic polyamino acid of claim 124 wherein A_1 and A_2, independently of one another, are substituted straight-chain or branched alkyl, alkenyl or alkynyl groups having from 2 to about 22 carbon atoms wherein the substituent is an aromatic alicyclic, heterocyclic or polycyclic ring and wherein one or more of the non-neighboring $-CH_2-$ groups of said alkyl, alkenyl or alkynyl group can be substituted with an O or S atom.

133. A composition for transfecting cells which comprises a nucleic acid and a lipophilic polyamino acid of claim 124.

134. The composition of claim 133 wherein the A_1 and A_2 groups of said lipophilic polyamino acid are alkyl groups having from about 12 to about 22 carbon atoms.

135. A lipid aggregate comprising a lipophilic polyamino acid of claim 124.

136. A method for transfecting a cell which comprises the step of contacting the composition of claim 133 with a cell.

137. A transfection kit which comprises one or more lipophilic polyamino acids of claim 124.

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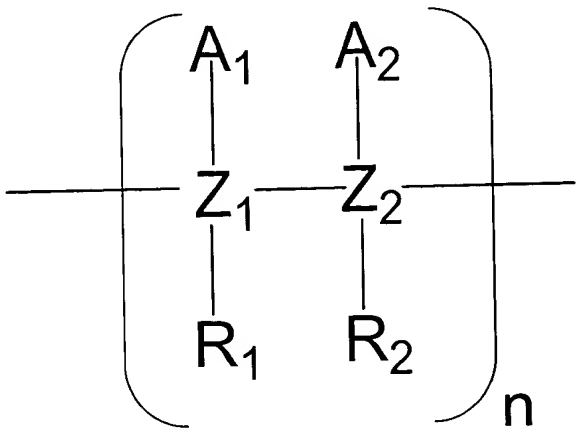
138. A lipophilic polycationic polysaccharide of formula:



and salts thereof,

where:

Z_1 and Z_2, independently of one another, are monosaccharides;

n is an integer ranging in value from 1 to about 600;

R_1 and R_2, independently of one another, are tertiary amines; and

A_1 and A_2, independently of one another, are selected from the group consisting of groups X_1 - X_4 as follows:

X_1 is a straight-chain alkyl, alkenyl, or alkynyl group having from 2 to about 22 carbon atoms wherein one or more non-neighboring $-CH_2-$ groups can be replaced with an O or S atom;

X_2 is a branched alkyl, alkenyl, or alkynyl group having from 2 to about 22 carbon atoms wherein one or more non-neighboring $-CH_2-$ groups can be replaced with an O or S atom;

X_3 is a straight-chain or branched alkyl group substituted with one or two OH, SH, NH_2 or amine groups within about 3 carbon atoms of the bond between X_3 and Z;

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X_4 is a substituted straight-chain or branched alkyl, alkenyl or alkynyl group having from 2 to about 22 carbon atoms wherein the substituent is an aromatic, alicyclic, heterocyclic or polycyclic ring and wherein one or more of the non-neighboring $-CH_2-$ groups of said alkyl, alkenyl or alkynyl group can be substituted with an O or S atom; and

the terminii of the polysaccharide dependent upon Z are H and OH.

139. The polycationic polysaccharide of claim 138 wherein Z_1 and Z_2 are both glucose.

140. The polycationic polysaccharide of claim 138 wherein n is between 50 and 100.

141. The polycationic polysaccharide of claim 138 wherein R_1 and R_2 are diethylaminoethyl groups.

142. The polycationic polysaccharide of claim 138 wherein A_1 and A_2, independently of one another, are a straight-chain or branched alkyl, alkenyl, or alkynyl group having from 2 to about 22 carbon atoms wherein one or more non-neighboring $-CH_2-$ groups can be replaced with an O or S atom.

143. The polycationic polysaccharide of claim 138 wherein alkyl, alkenyl, or alkynyl groups have from about 12 to about 22 carbon atoms.

144. The polycationic polysaccharide of claim 138 wherein A_1 and A_2, independently of one another, are straight-chain or branched alkyl groups substituted with one or two OH, SH, NH_2 or amine groups within about 3 carbon atoms of the bond between X_3 and Z.

145. The polycationic polysaccharide of claim 138 wherein A_1 and A_2, independently of one another, are substituted straight-chain or branched alkyl, alkenyl or alkynyl groups having from 2 to about 22 carbon atoms wherein the substituent is an aromatic, alicyclic, heterocyclic or polycyclic ring and wherein one or more of the non-neighboring $-CH_2-$ groups of said alkyl, alkenyl or alkynyl group can be substituted with an O or S atom.

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146. A composition for transfecting cells which comprises a nucleic acid and a polycationic polysaccharide of claim 138.

147. The composition of claim 146 wherein the A_1 and A_2 groups of said polycationic polysaccharide are alkyl groups having from about 12 to about 22 carbon atoms.

148. A lipid aggregate comprising a polycationic polysaccharide of claim 138.

149. A method for transfecting a cell which comprises the step of contacting the composition of claim 146 with a cell.

150. A transfection kit which comprises one or more polycationic polysaccharides of claim 138.

151. A composition for transfecting a cell with a nucleic acid which comprises a nucleic acid and one or more compounds according to claim 108.

152. A lipid aggregate which comprises one or more compounds of claim 108.

153. A method for transfecting a cell comprising eh step of contacting the cell with a lipid aggregate comprising a nucleic acid and one or more compounds according to claim 108.

154. A transfection kit which comprises one or more compounds of claim 108.

155. A composition for transfecting a cell with a nucleic acid which comprises a compound of claim 161 capable of complexing said nucleic acid to be transfected into said cell, and a transfection-enhancing agent selected from the group consisting of an enveloped virus, a membrane virus, a viral component, and a non-viral fusagenic compound.

156. A composition according to claim 155 wherein said transfection-enhancing agent is an enveloped virus, and wherein said enveloped virus is an alphavirus.

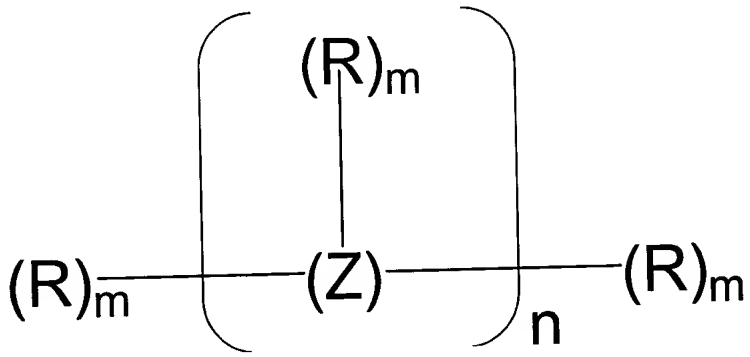
157. A composition according to claim 155 wherein said alphavirus is Semliki Forest virus.

158. A composition according to claim 155 wherein said transfection-enhancing agent is a viral component and wherein said viral component is selected from the group consisting of viral proteins, envelope fusion peptides, viral spike glycoproteins, viral peptides of viral spike glycoproteins, and viral envelope fragments containing embedded viral protein.

159. A composition according to claim 155 wherein said transfection-enhancing agent is a non-viral fusagenic peptide.

160. A method for transfecting a cell comprising the steps of contact the cell with a transfecting composition of claim 155.

161. A polyaminoacid with the structure:



and salts thereof, where:

n is an integer ranging from 2 to about 2,000;

m is either 0 or 1, provided that m is 1 at least once in the compound and m is zero at least once in the compound when Z is an amino acid and when m=0 at a terminus, the terminus of the polyamino acid is an NH_2 or a OH;

R is R_A or R_B, where R_A is C_{1-23} alkyl or alkenyl and R_B is a steroid selected from the group consisting of stigmasterol, ergosterol and cholic acid; and

Z is an amino acid wherein Z groups are linked by peptide bonds.--